Application of current 3D and psuedo-3D imaging for conservators

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Conservation professionals have been aware of modern methods of 3D digitization, but a comprehensive guide including the strengths and weaknesses of available technologies is not available. A reference that includes differing results, and addressing the most appropriate fields of application will help these professionals incorporate 3D and pseudo-3D imaging. With goals of broadened access, preservation, supporting education, and for enriching context, cultural heritage professionals are turning to digitization for the documentation of museum objects. Digital imaging of collections includes capturing 3D information, which supports research, preservation, documentation, etc. Digital surrogates provide easier and better access for researchers: a digital file can travel the world without the object being handled and exposed to the elements, thereby aiding in the preservation of the object. Digitization provides interactive and accessible exhibits, displays, websites, etc., and opportunities for education initiatives and means of enriching the context. Digital imaging, including 3D and pseudo-3D, can be a truly democratic, non-destructive, non-contact method of researching and conserving an object.

There are already many techniques that capture 3D information, both true 3D and pseudo-3D. 3D imaging involves surface and volume-based three-dimensional measurement that can result in physical or virtual replication. In contrast, pseudo-3D imaging techniques provide surface information but may lack in the precision or surface measurement capabilities. The imaging techniques we will be presenting include 3D scanning using laser or projected white light, photogrammetry, Reflectance Transformation Imaging (RTI), Quick Time Virtual Reality (QTVR), and HD Video. We will provide a description of these methods in the presentation along with offering guidance for the most appropriate applications. In choosing the appropriate imaging method, one needs to assess the research questions, desired outcome, and the project budget in light of the available technologies and their associated strengths and weaknesses. Understanding what is being attempted, what is achievable, and the true cost will help to inform the selection of the appropriate technique.

This presentation will follow the digital acquisition, data processing, and examine the final product. We will use the methods listed above for a single object: a carved and painted wooden sculpture. By digitizing the same object with a variety of techniques, we will be able to more effectively present the comparison of these imaging methods, including specific examples of strengths and weaknesses and other applications. In comparing the techniques, we will look at “3D-ness”, resolution, color accuracy, portability of the technique, accessibility of the resulting product, universality of delivery, skill level required, equipment cost, and archival standards.

There is no single technique that will be ideal for all objects requiring excellent spatial resolution, calibrated color, in an easy to distribute package. Each technique has its advantages and weaknesses, produces different results, and has different fields of application. Sometimes a combination of techniques is most effective. This presentation will look at realistic options for imaging cultural heritage objects along with a comparison of those techniques.

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Melvin J. Wachowiak received an M.S. from Winterthur Museum, Art Conservation Program, University of Delaware and a B.S. in studio art from Springfield College. He has been at the Smithsonian since 1989, and involved in projects in the fine arts, anthropology and archeology, and the history of technology collections. He has lectured widely, and his work on protective and decorative coatings resulted in US Patents in 2000 and 2001. Since 2004, he has lead MCI's use of new and advanced spatial and spectral imaging techniques such as 3D scanning, 3D microscopy, and other computational and digital imaging.

E. Keats Webb graduated in 2007 from the University of North Carolina at Chapel Hill with a BFA in photography. In August 2010, she started her own imaging business focusing on scientific and computational imaging and event photography. She has been an Imaging Specialist Contractor since 2010 working with the Smithsonian Institution including the Museum Conservation Institute, the Freer | Sackler Galleries, the National Museum of American History and the National Museum of Natural History. Her work includes scientific and computational imaging, research and technique development, digital asset management, and video.